REMARKS

I. Introductory Comments

In view of the foregoing amendments and following remarks responsive to the Final Office Action of August 30, 2003, Applicant respectfully requests favorable reconsideration of this application.

This Amendment either places this case in form for allowance or better form for appeal and, therefore, should be entered. Specifically, the amendments made herein merely are responsive to an antecedent basis rejection of the claims under 35 U.S.C. § 112, second paragraph and/or improve the grammar of the claims without altering their scope.

Applicant has filed a Notice of Appeal simultaneously with this Reply.

II. The 112 Rejections

In section 3 of the Final Office Action, the Office asserted that the term "the horizon" in claims 1 and 4 lacked proper antecedent basis. Applicant respectfully disagrees, but has offered an amendment to the claims that hopefully makes this rejection moot in any event. Specifically, Applicant has replaced "the horizon" with simply "horizon". Applicant believes that both the former and the new terminology are perfectly acceptable. The term "the horizon" does not invoke an antecedent basis issue because the horizon is a virtual reference plane that is well understood in the related arts. There is only one horizon for a given antenna and, therefore, calling it "the horizon" does not cause any indefiniteness in the claim. In any event, the present amendments should overcome this rejection.

The Office further rejected claims 1 and 4 as indefinite under 35 U.S.C. § 112, second paragraph, stating that the step of " ... radiating elements to mitigate radiation above the horizon" seems to be considered a critical step in the application, but that applicant acknowledged that "the radiation pattern of a standard LMDS antenna shows insufficient signal gain (as in Figure 6) of the gain pattern profile above the horizon; in other words, it is admitted as a fact that the more signal travels, the less signal gain produces [and t]herefore, there is no novel feature at all herein."

Applicant respectfully traverses. Figure 6 is not prior art, but, in fact, is the present invention. It is unclear why the Office would consider it to constitute an admission regarding the prior art. Figure 6 is described in the Detailed Description section of the application and is not labeled as prior art. See page 4, lines 19-24 and page 8, lines 4-12, which state, respectively:

> Figure 6 is a graph of the polar gain pattern of a carrier signal transmitted by an LMDS antenna that is altered to minimize radiated power above the horizon relative to the radiating antenna elements at the top of the altered LMDS antenna.

and

> According to the invention, the LMDS antenna 1 is altered by the number of radiating antenna elements and the phase angle of carrier signals supplied to the antenna elements to minimize the portion of the gain pattern profile that occurs above the horizon. As shown in Figure 6 the gain pattern above the horizon is substantially reduced in area bounded by the gain pattern, as compared to that of the gain pattern along and below the horizon.

Therefore, this argument is moot and the rejection should be withdrawn.

In addition, Applicant has rearranged the words of the claim in order to improve their form. Particularly, the previous language "antenna elements being adjusted in phase and in amplitude" was awkward in that, obviously, it is the signal being input to

the antenna elements that has its phase and amplitude adjusted, not the physical antenna elements themselves.

III. The Present Invention

The present invention relates to an LMDS antenna array having multiple radiating antenna elements wherein the antenna elements are adjusted in phase and amplitude to achieve certain novel radiation patterns. Particularly, claims 1 and 4 recite that the antenna elements are adjusted in phase and amplitude to (1) mitigate radiation above the horizon; and (2) decrease attenuation in radiating power with distance from the antenna. Claims 2 and 5 depend from Claims 1 and 4, respectively, and further add that the antenna elements are adjusted in phase and amplitude to mitigate nulls between lobes of combined radiated signals. Finally, Claims 3 and 6 depend from Claims 1 and 4, respectively, and add that the antenna elements are adjusted in phase and amplitude to reduce excess signal power at near range.

IV. The Prior Art Rejections

A. The Specific Rejections

The Office rejected all pending claims, Claims 1-6, under 35 U.S.C. §103(a) as being unpatentable over Blasing in view of Langston. These rejections are essentially repeats of the rejections contained in the previous Office Action. Notably, they still include the inconsistency from the previous Office Action of the alternate assertions by the Office that (1) Blasing teaches minimizing radiation above the horizon (see Final Office Action, section 6, lines 9-10) and (2) the admission on page 7, lines 3-4 of the Final Office Action that "Blasing might not clearly show that the step of 'each of the

antenna elements being adjusted in phase and in amplitude of radiated signal across the radiating elements to mitigate radiation above the horizon'". Without clarification, Applicant will continue to assume that the Office concedes that Blasing does not teach this feature. Furthermore, in the response to the previous Office Action, Applicant noted that Applicant had previously traversed the Office's assertion that Blasing teaches adjusting the phase and amplitude of the radiated signal to decrease attenuation in radiated power with distance from the antenna and that the Office had not addressed those arguments and, thus, left Applicant guessing as to how to further address that issue. Applicant notes that, despite its request for clarification in the previous response, the Office has again failed to address Applicant's arguments in this regard. Hence, Applicant still does not have any guidance from the Office as to where, if at all, the Office disagrees with Applicant's assessment of Blasing in this regard.

The Office asserted that Blasing discloses an LMDS system having an antenna with multiple radiating antenna elements, each of the antenna elements being adjusted in phase and amplitude of radiated signals across the radiating elements to mitigate radiation above the horizon, i.e., radiation or signal power output can be attenuated above the horizon, and each of the antenna elements being adjusted in phase and amplitude of radiated signal therefrom to decrease attenuation in radiating power with distance from the antenna (see column 21, lines 40-53: to insure the attenuation among radiated power from nearby antennas).

The Office further stated that:

> Blasing might not clearly show the step of 'each of the antenna elements being adjusted in phase and in amplitude of radiated signal across the radiating elements to mitigate radiation above the horizon' as argued by the Applicant; however, in the same field of endeavor, Langston clearly

> teaches that the phase shifts and the amplitude of radiated signals across the radiating elements of an antenna array (Figs. 6-7) can be adjusted, for example, the stubs 83 can be adjusted for the phase shifts and the amplifiers 67 for amplifying or amplitude adjusting for an antenna array in an LMDS system (col. 6/lines 8-22 & col. 6/line 23 to col. 7/line 22 for LMDS system). Therefore, it would have been obvious to one of ordinary skill in the art at the time that the invention was made to modify Blasing's system with Langston's technique of adjusting in phase and amplitude as disclosed in order to obtain an enhanced LMDS system that can adjust the phase and amplitude of radiated signals across the radiating element of an antenna array to mitigate radiation above the horizon for decreasing the attenuation in radiated power with distance from the antenna as desired.

Applicant respectfully traverses this rejection.

Turning first to the issue of whether Langston teaches adjusting the phase and amplitude of the signal radiated by the radiating elements to attenuate the output signal above the horizon, the most pertinent portion of the parts of Langston cited by the Office appears to be column 6, lines 9-22. That portion of Langston states:

> In order to form the narrow vertical antenna pattern, it is necessary that the linear array be phased in a proper proportion between each of the 20 radiating patches 30, and this is accomplished by phase shifters 73 between the amplifiers 67 and the antenna radiators 30 as represented in FIG. 9. One amplifier 67 may be used for all twenty radiators 30 of a linear array as shown in FIG. 10 and 12, or two amplifiers as shown in FIG. 11- one for each ten radiators. The amplification preferably is done as illustrated in FIG. 12 with amplifiers for each of the antenna radiators 30 separately. The amplification may also be done by power dividers dividing up the signal to amplifiers and then combining the signals. The phase shifts can be adjusted by the distance between the stubs 83 of FIG. 4.

As noted in response to the previous Office Action, Applicant does not comprehend what the Office is reading into this section of Langston. There is no discussion of either (1) attenuating radiation above the horizon or (2) adjusting the amplitude among the radiating elements in this section of Langston. This section

concerns adjustments to form a "narrow vertical antenna pattern." How is this deemed to be relevant to what is being claimed?

The only response to Applicant's previous arguments is found in section 7 of the Final Office Action, where the Office asserts:

> The applicants argue that Blasing and Langston do not teach or suggest as for claims 1 and 4, the step of "... radiating elements to mitigate radiation above the horizon" seems to be brought up as a critical step in the present application for allowance; however, the examiner found that, as acknowledged by the applicants, the radiation pattern of a standard LMDS antenna shows insufficient gain (as in Figure 6) of the gain pattern profile above the horizon (page 9, lines 3-10); in other words, it is admitted as a fact that the more signal travels, the less signal gain produces. Thus, there is no novel feature at all herein.

There are significant problems with the Office's treatment of the specification and the prior art in connection with this argument. First, as noted above, Figure 6 shows the present invention, not the prior art. Accordingly, the portion of the specification cited by the Office actually stands for the opposite proposition than the one asserted by the Office. Secondly, the Office's assertion in the quote above that Applicant has "admitted as a fact that the more signal travels, the less signal gain produces" (1) does not make sense; (2) does not follow from the preceding argument (which argument, as just noted, is wrong in any event); and (3) is not even relevant to the claim. Specifically, is the Office asserting that the signal strength attenuates with distance from the source? Is the Office asserting that this has any bearing on gain within the antenna? The phrase is simply incomprehensible. Secondly, even if the specification discloses mitigating gain above the horizon, that has nothing to do with gain as a function of distance from the antenna. Thirdly, the only limitation in the claims concerning signal strength as a function of distance recites "decreas[ing] attenuation in radiated power with distance

from the antenna," i.e., minimizing signal attenuation as a function of distance from the antenna elements. As best as Applicant can comprehend, the Office's assertion that "the more signal travels, the less signal gain produces" appears to be basically the opposite of the claim recitation.

B. The Basic Difference Between the Present Invention and the Prior Art

The foregoing problems suggest that the Office may not be truly appreciating what Applicant is asserting as its invention. At its most fundamental level, the present invention is to adjust an LMDS antenna to achieve the goals of (1) minimizing radiation above the horizon (claims 1 and 4); (2) minimizing attenuation of the signal with distance (claims 1 and 4) such as by reducing excess signal power at near range (claims 3 and 6); and (3) minimizing nulls between lobes of combined radiated signals collectively from the antenna elements (claims 2 and 5). These are not known goals in LMDS antenna design of the prior art. The Office has not presented prior art that discloses these goals for the tuning of an LMDS antenna. The invention is, therefore, patentable as claimed. Without making any assertions or admissions as to what techniques for adjusting antenna radiation patterns are or are not found in the prior art, Applicant does not consider the key to its invention to lie as much in the techniques for adjusting radiation patterns, but more in the discovery of the beneficial nature of the recited radiation patterns.

On the other hand, it seems that the Office may be focusing on the adjustment techniques rather than the goals of the adjustments. Particularly, while the applied prior art may contain some relevant discussion of antenna tuning techniques, the applied prior art, as a whole, teaches very little, if anything, as to the tuning goals recited in the

claims (e.g., minimizing gain above horizon, mitigating nulls between lobes, decreasing attenuation as a function of distance).

For instance, with respect to the use of phase differentiation between the radiating elements to attenuate amplification above the horizon, Applicant notes that the Office has not even asserted that Langston teaches phase differentiation for the purpose of attenuating the signal above the horizon. Rather, the Office asserted that Langston teaches phase differentiation in an LMDS system and that it would be obvious to use this teaching of Langston in Blasing to attenuate radiation above the horizon. This is purely hindsight reconstruction. There is no discussion of motivation in the prior art of record of attenuating radiation above the horizon in an LMDS antenna. Neither Langston nor Blasing contain any discussion of attenuating radiation above the horizon. Accordingly, the obviousness rejection based on the combination of Blasing and Langston fails to state a prima facie obviousness case because the references do not teach adjusting phase to attenuate radiation above the horizon. Langston teaches adjusting phase to form a narrow vertical antenna pattern, not to attenuate radiation above the horizon.

Accordingly, the rejection of claims 1 and 4 fails.

C. The Dependent Claims

The Office also asserted that Blasing teaches the features claimed of dependent claims 2, 3, 5, and 6.

This is untrue. Claims 2 and 5 recite that the antenna elements are adjusted in phase and amplitude to mitigate nulls between lobes of combined radiated signals

collectively from the antenna elements. The Office asserted that Blasing teaches a system in which "the maximum and minimum power level is maintained by implementing the low sidelobe or shaped beam antennas in adjacent sectors." Applicant has reviewed the cited portions of Blasing and is unable to find any discussion of nulls between lobes, let alone mitigation of them. Furthermore, it is unclear what is meant by the Office's statement that, in Blasing, "the maximum and minimum power level is maintained by implementing the low sidelobe or shaped beam antennas in adjacent sectors" or what relevance such a disclosure would have to the claimed feature. Furthermore, even if Blasing did teach "implementing the low sidelobes or shaped beam antennas in adjacent sectors", to the extent understood by the Applicant, this would seem to be very different and possibly the opposite of **minimizing** nulls **between** lobes, as it seems that such a pattern might increase nulls between side lobes.

Accordingly, dependent claims 2 and 5 even further distinguish over the prior art.

Dependent claims 3 and 6 add the limitation that the antenna elements are adjusted in phase and amplitude to reduce excess signal power at near range. The Office asserted that this is taught by Blasing in column 22, lines 35-50 by the fact that Blasing discloses reducing excess power output at near range or at adjacent sectors by eliminating unwanted energy from using low sidelobe antennas. Once again, the cited section of Blasing does not appear to have anything to do with the subject matter of the claim, namely, reducing excess signal power at near range. The claimed feature is discussed on page 6, line 17 - page 7, line 12 of the present application and is demonstrated in Figure 1, most notably by the difference between trace 6 (prior art) and

trace 7 (invention) in the 0 to 1000 meter portion of the graph. However, this section of Blasing deals with gain as a function of angle and, contrary to the Office's assertions, does not address the matter of reducing power at near range.

Accordingly, dependent claims 3 and 6 distinguish over the prior art for these additional reasons.

V. Conclusion

In view of the foregoing remarks, this application is now in condition for allowance. Applicant respectfully requests the Examiner to issue a Notice of Allowance at the earliest possible date. The Examiner is invited to contact Applicant's undersigned counsel by telephone call in order to further the prosecution of this case in any way.

Respectfully submitted,

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